Security Advantages of Centralized Fiber Networks

3M Innovation

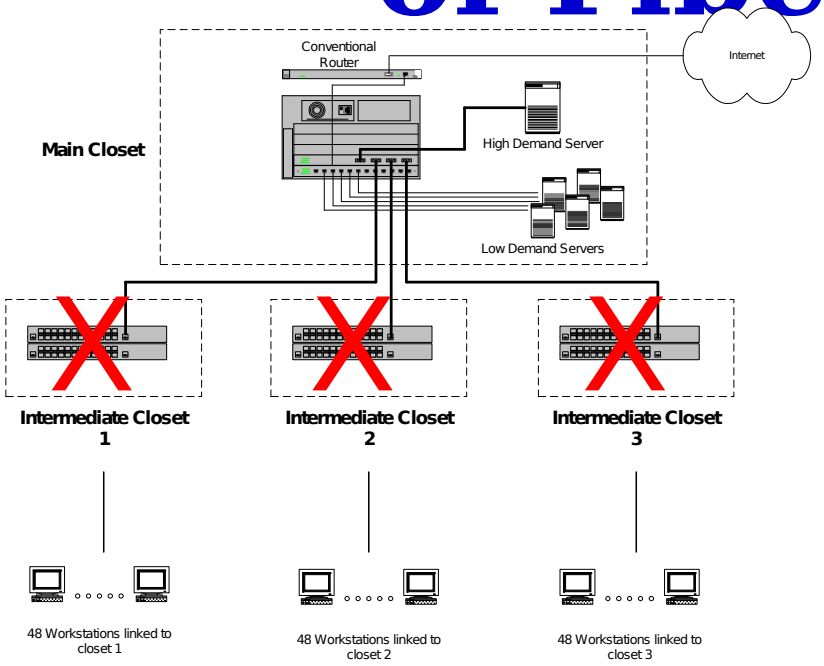
Traditional Security Features of Fiber Optics

Electromagnetic Interference

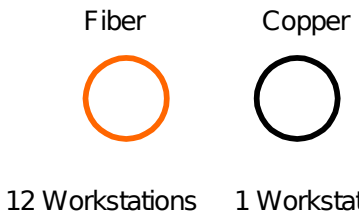
Conventional Tapping

Radio Frequency Interference

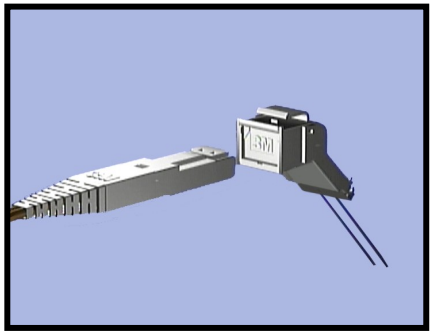
Additional Security Features of Fiber Optics



Reduction of Security Points



Less Obtrusive Cabling



Rapidly Deployable Connectors

Fiber Capabilities Today

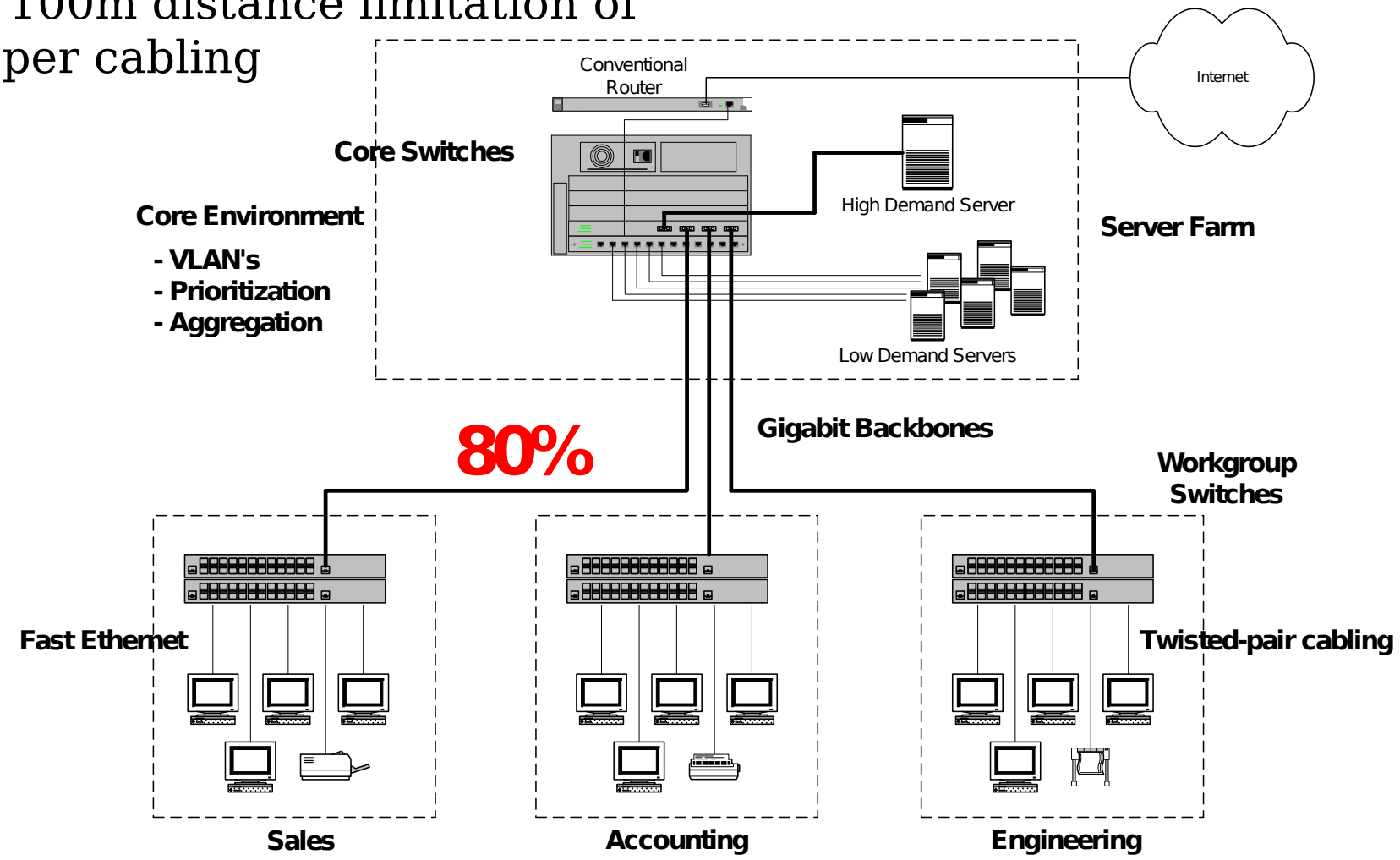
- High Bit Rate - 10,100,1000Mbps per wavelength
- Simple Duplex Operation
  - No compression and multiplexing needed for high bit rate
- Long Distance Transmissions

This is the most valuable feature today for delivering non-blocked bandwidth and reducing security points

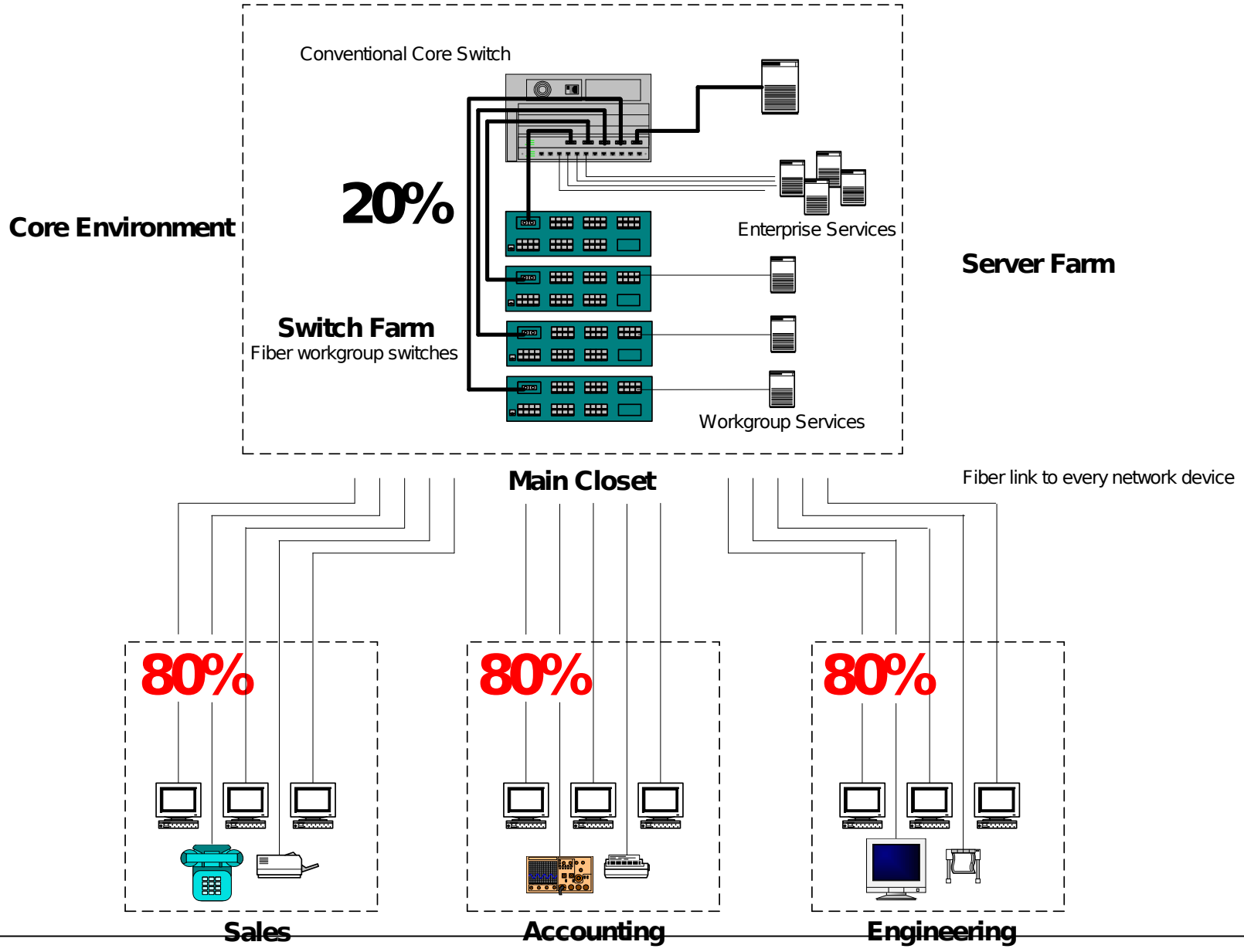
Long Distance Transmissions Enable the Following:

- Implementation of Centralized Architecture
  - Fewer Equipment Closets
  - Simplified Management
  - Control of Quality of Service
- Formation of “Switch Farms”
- User / Services / Backplane Matching
- Greater Bandwidth and Port Efficiencies
- Increased Security

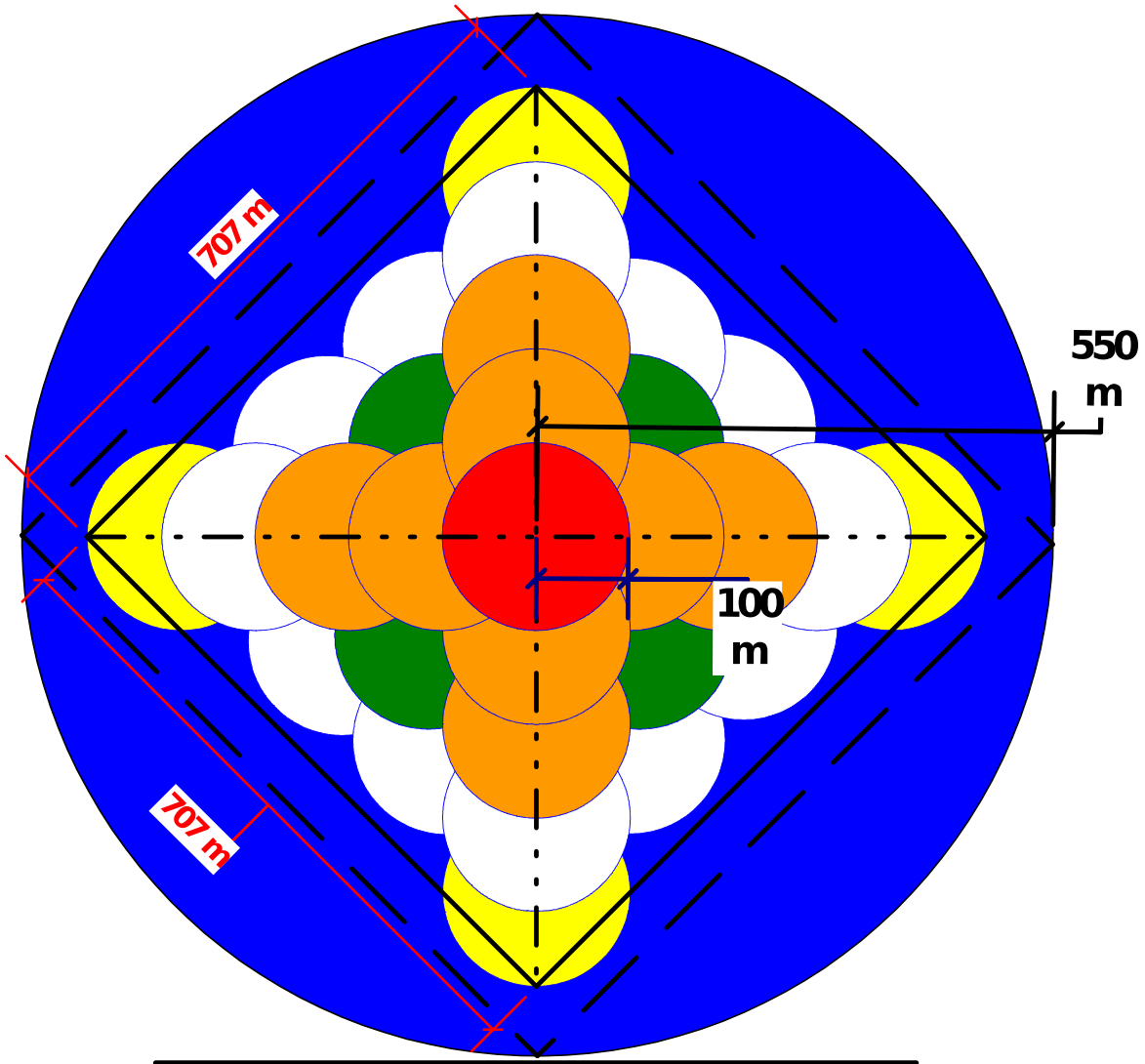
Traditional data networks require multiple equipment closets to support the 100m distance limitation of copper cabling



A Centralized Fiber Network with Switch Farm



1 gb Bandwidth: FTTD vs. Copper



As is graphically demonstrated by this design, it would take at least 29 closets of copper Cat6 to cover the same area that a single MDF would cover using **3M** Volition 50 micron fiber. That is if we take off 50 meters from the radius of the fiber!

No need for 28 extra environmetally controlled closets with active components since all the electronics are in the MDF. No need for technicians to run between closets to trouble shoot since there are only two (2) points of failure; in the MDF or at the workstation.

The area that we are talking about covering?
approx **500,000 sq m** or approx **1,600,000** sq ft
with a single closet.

Benefits of Centralized Fiber Networks for Security

1. Immunity to electromagnetic and radio interference.
2. Very difficult to tap
3. Elimination of closets reduces security points and overhead
4. Smaller size and weight of fiber lowers infrastructure footprint
5. New connector technology allows fiber to be installed rapidly with compact tools.

VF-45™ Keyed Interconnect:

3M Innovation

VF-45™ Keyed Interconnect Why control access?

- Layer 1 Security
- Avoid accidental mechanical connection to classified networks
- Enable easy identification of separate networks
- Physically separate services (e.g. VoIP)

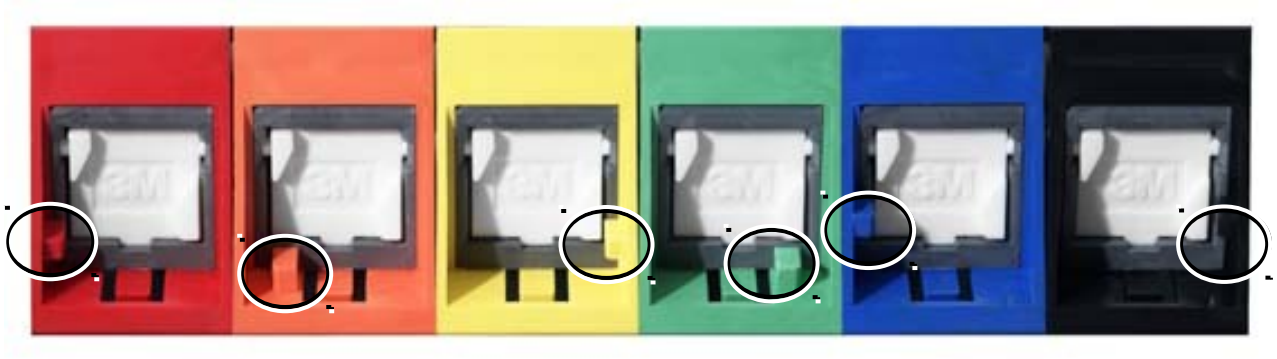
VF-45™ Keyed Interconnect Identify Separate Networks

- Color coding via 6 different colors:

- Easily distinguish networks that wish to separate principal users from secure users

VF-45™ Keyed Interconnect How does it work?

- Keying accomplished with the mating of the complete interconnect, both plug and socket
- 6 different keying locations on interconnect



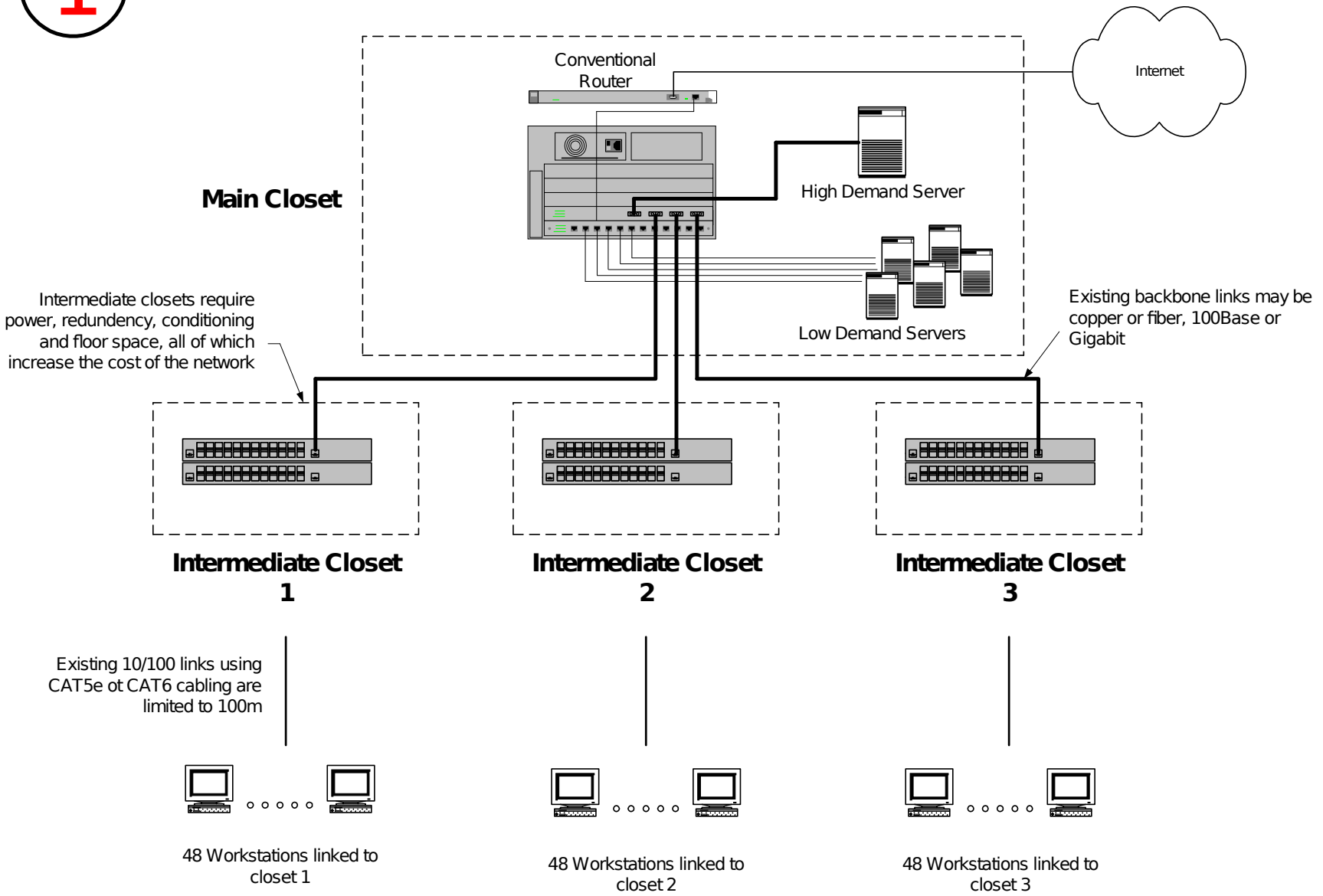
- Each keying location is distinctly colored

Migrating to Centralized Fiber Networks

3M Innovation

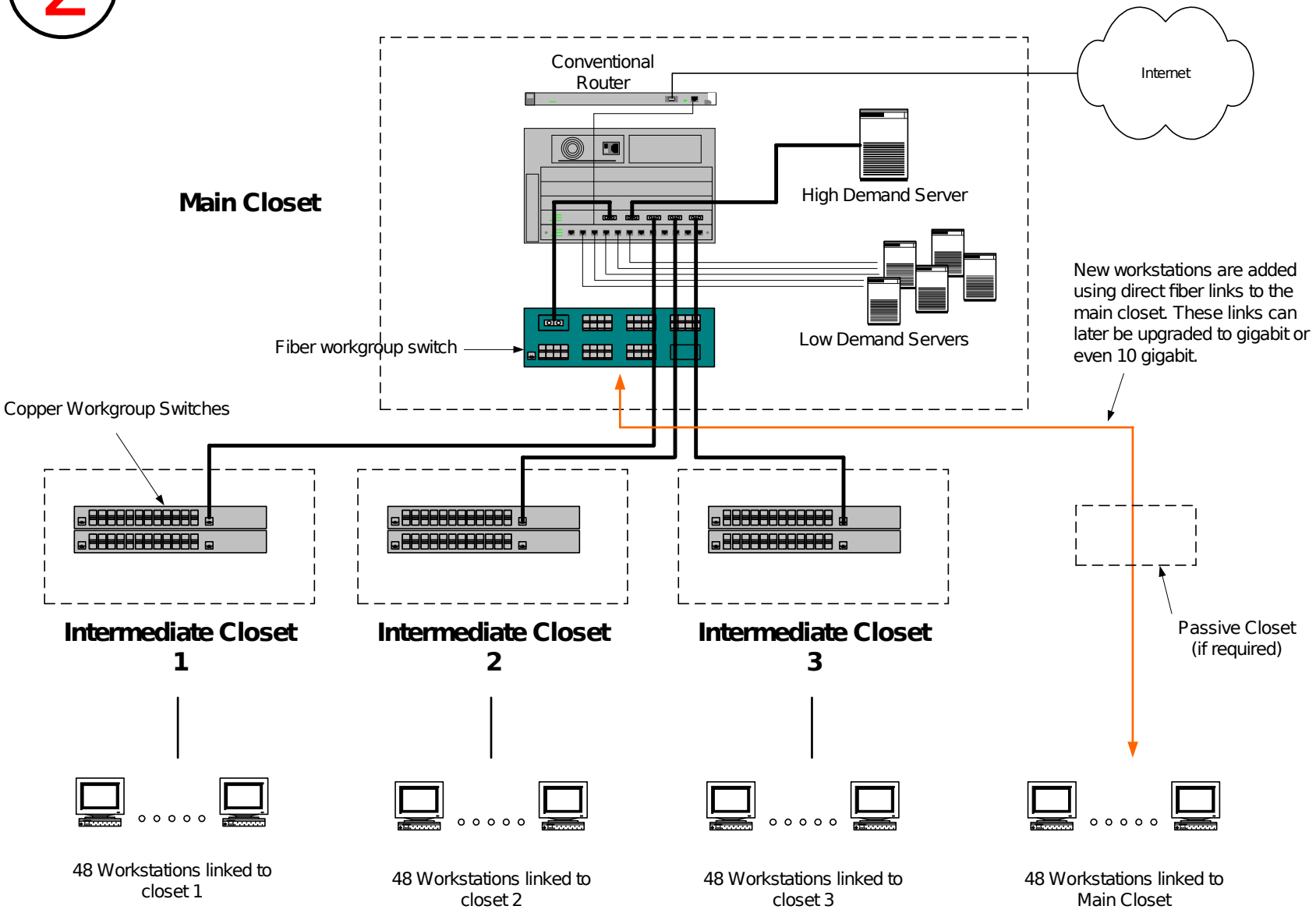
1

Migrating to Fiber - Existing Network


Conventional Router
Internet
Main Closet
High Demand Server
Low Demand Servers
Intermediate closets require power, redundency, conditioning and floor space, all of which increase the cost of the network
Existing backbone links may be copper or fiber, 100Base or Gigabit
Intermediate Closet 1
Intermediate Closet 2
Intermediate Closet 3
Existing 10/100 links using CAT5e ot CAT6 cabling are limited to 100m
48 Workstations linked to closet 1
48 Workstations linked to closet 2
48 Workstations linked to closet 3

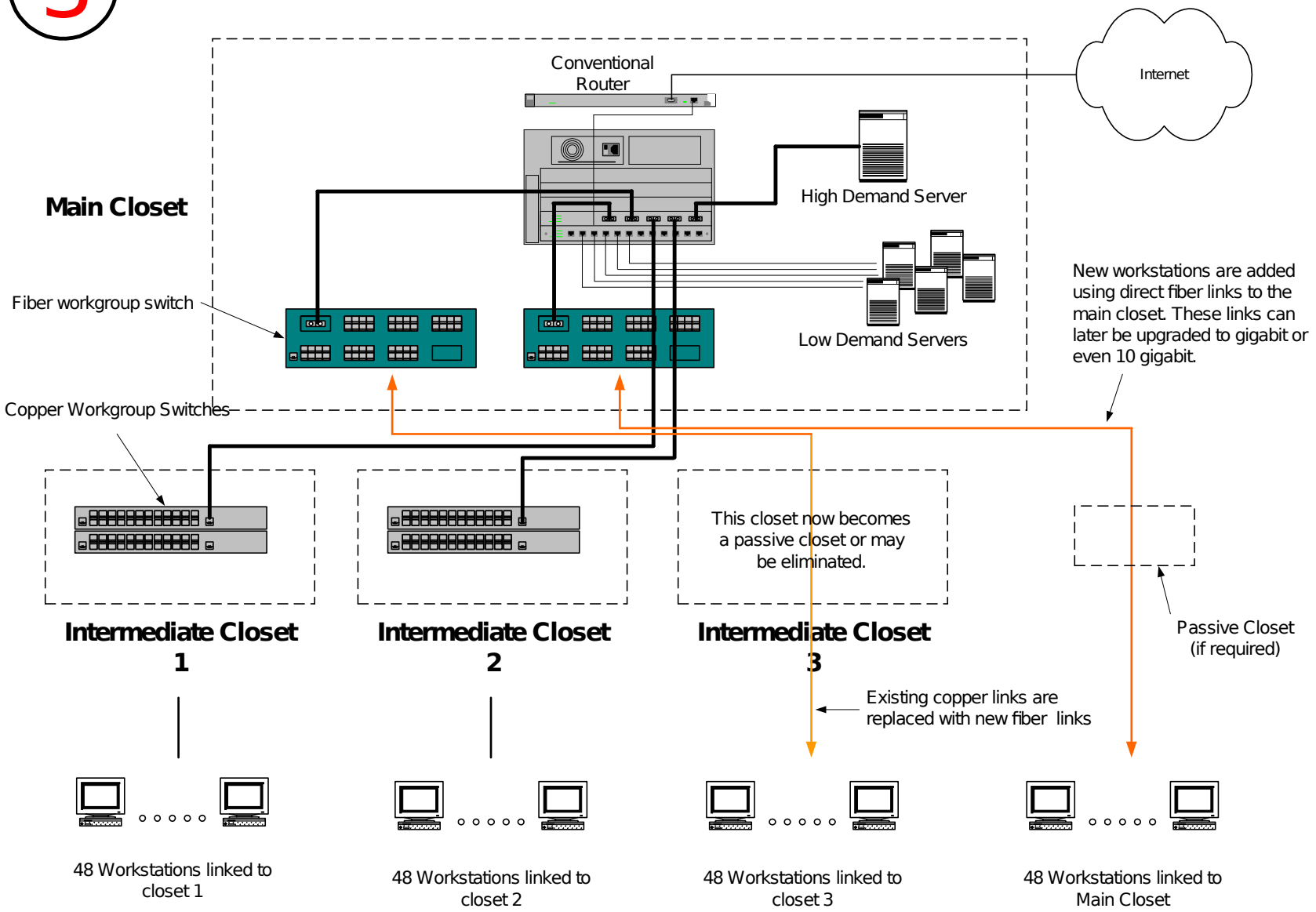
2

Migrating to Fiber - Adding New Fiber Workstations


Conventional Router
Internet
Main Closet
High Demand Server
Low Demand Servers
Fiber workgroup switch
New workstations are added using direct fiber links to the main closet. These links can later be upgraded to gigabit or even 10 gigabit.
Copper Workgroup Switches
Intermediate Closet 1
Intermediate Closet 2
Intermediate Closet 3
Passive Closet (if required)
48 Workstations linked to closet 1
48 Workstations linked to closet 2
48 Workstations linked to closet 3
48 Workstations linked to Main Closet

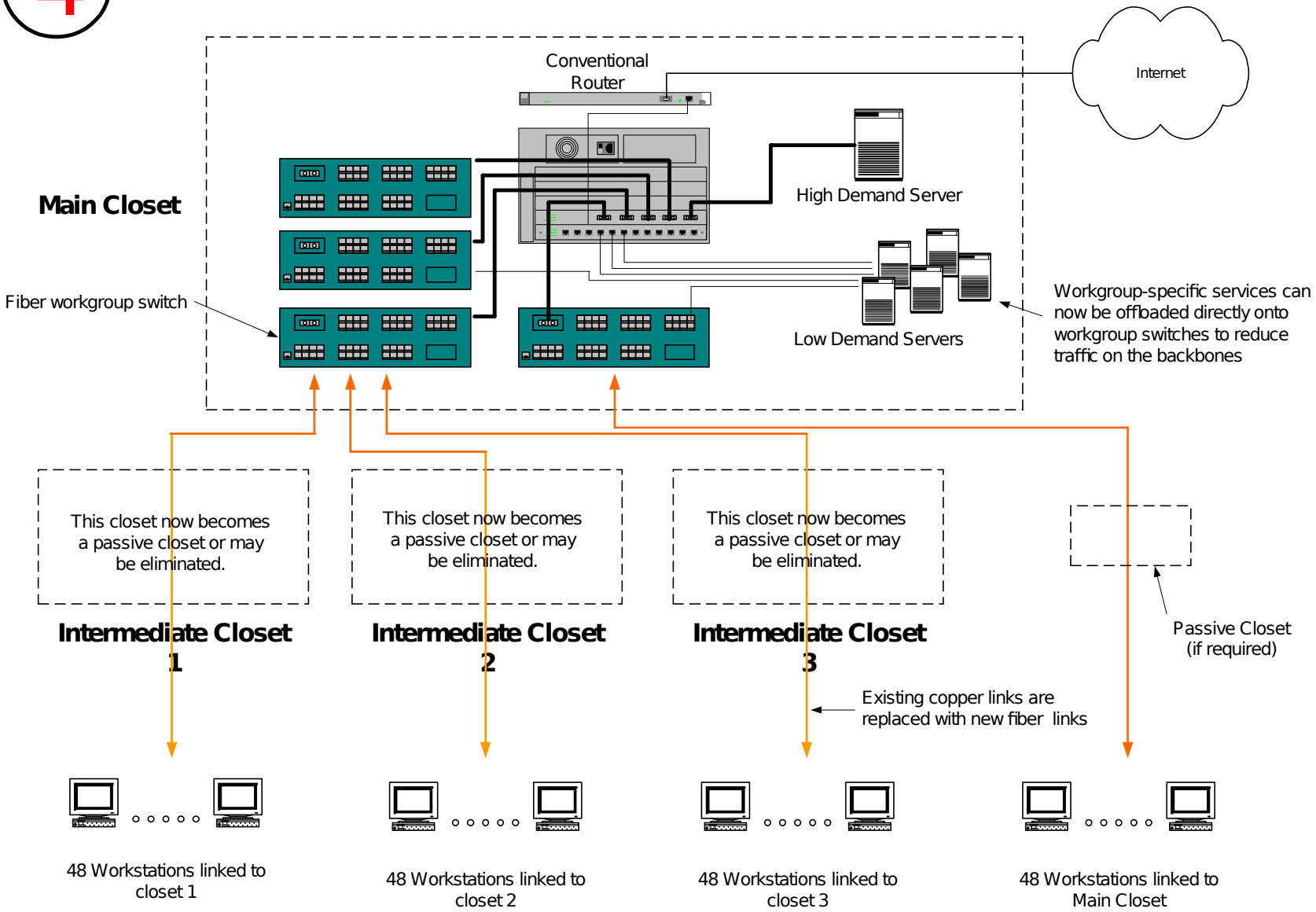
3

Migrating to Fiber - Replacing Existing Cabling


Conventional Router
Internet
Main Closet
High Demand Server
Low Demand Servers
Fiber workgroup switch
Copper Workgroup Switches
New workstations are added using direct fiber links to the main closet. These links can later be upgraded to gigabit or even 10 gigabit.
This closet now becomes a passive closet or may be eliminated.
Passive Closet (if required)
Intermediate Closet 1
Intermediate Closet 2
Intermediate Closet 3
Existing copper links are replaced with new fiber links
48 Workstations linked to closet 1
48 Workstations linked to closet 2
48 Workstations linked to closet 3
48 Workstations linked to Main Closet

4

Migrating to Fiber - Completing the Conversion


Conventional Router
Internet
Main Closet
High Demand Server
Fiber workgroup switch
Low Demand Servers
Workgroup-specific services can now be offloaded directly onto workgroup switches to reduce traffic on the backbones
This closet now becomes a passive closet or may be eliminated.
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This closet now becomes a passive closet or may be eliminated.
Intermediate Closet 1
Intermediate Closet 2
Intermediate Closet 3
Passive Closet (if required)
Existing copper links are replaced with new fiber links
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48 Workstations linked to closet 2
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48 Workstations linked to Main Closet